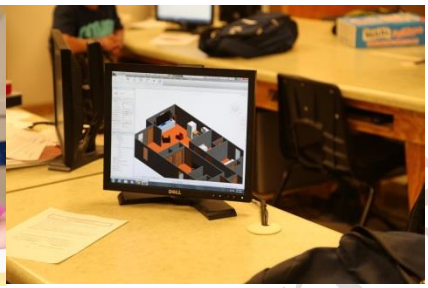
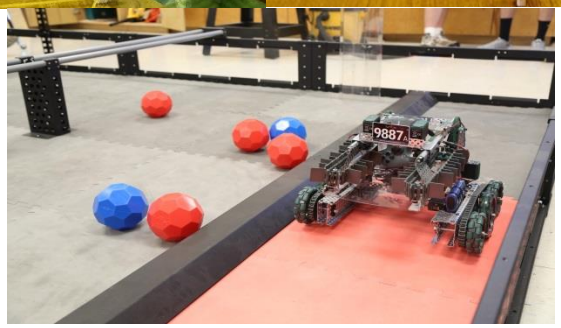
SUPPORT GUIDE FOR GRADE TWO SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

Molly M. Spearman
State Superintendent of Education

SOUTH CAROLINA
STATE DEPARTMENT
OF EDUCATION





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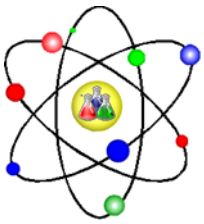


INTRODUCTION TO GRADE TWO STANDARDS

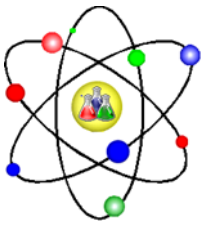
Science is a way of understanding the physical universe using observation and experimentation to explain natural phenomena. Science also refers to an organized body of knowledge that includes core ideas to the disciplines and common themes that bridge the disciplines. This document, *South Carolina Academic Standards and Performance Indicators for Science*, contains the academic standards in science for the state's students in kindergarten through grade twelve.

ACADEMIC STANDARDS

In accordance with the South Carolina Education Accountability Act of 1998 (S.C. Code Ann. § 59-18-110), the purpose of academic standards is to provide the basis for the development of local curricula and statewide assessment. Consensually developed academic standards describe for each grade and high school core area the specific areas of student learning that are considered the most important for proficiency in the discipline at the particular level.

Operating procedures for the review and revision of all South Carolina academic standards were jointly developed by staff at the State Department of Education (SCDE) and the Education Oversight Committee (EOC). According to these procedures, a field review of the first draft of the revised South Carolina science standards was conducted from March through May 2013. Feedback from that review and input from the SCDE and EOC review panels was considered and used to develop these standards.

The academic standards in this document are not sequenced for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *South Carolina Academic Standards and Performance Indicators for Science* is not a curriculum.



THE PROFILE OF THE SOUTH CAROLINA GRADUATE

The *2014 South Carolina Academic Standards and Performance Indicators for Science* support the *Profile of the South Carolina Graduate. The Profile of the South Carolina Graduate* has been adopted and approved by the South Carolina Association of School Administrators (SCASA), the South Carolina Chamber of Commerce, the South Carolina Council on Competitiveness, the Education Oversight Committee (EOC), the State Board of Education (SBE), and the South Carolina Department of Education (SCDE) in an effort to identify the knowledge, skills, and characteristics a high school graduate should possess in order to be prepared for success as they enter college or pursue a career. The profile is intended to guide all that is done in support of college- and career-readiness.

Profile of the South Carolina Graduate

World Class Knowledge

- Rigorous standards in language arts and math for career and college readiness
- Multiple languages, science, technology, engineering, mathematics (STEM), arts and social sciences

World Class Skills

- Creativity and innovation
- Critical thinking and problem solving
- Collaboration and teamwork
- Communication, information, media and technology
- Knowing how to learn

Life and Career Characteristics

- Integrity
- Self-direction
- Global perspective
- Perseverance
- Work ethic
- Interpersonal skills

Approved by SCASA Superintendent's Roundtable and SC Chamber of Commerce.

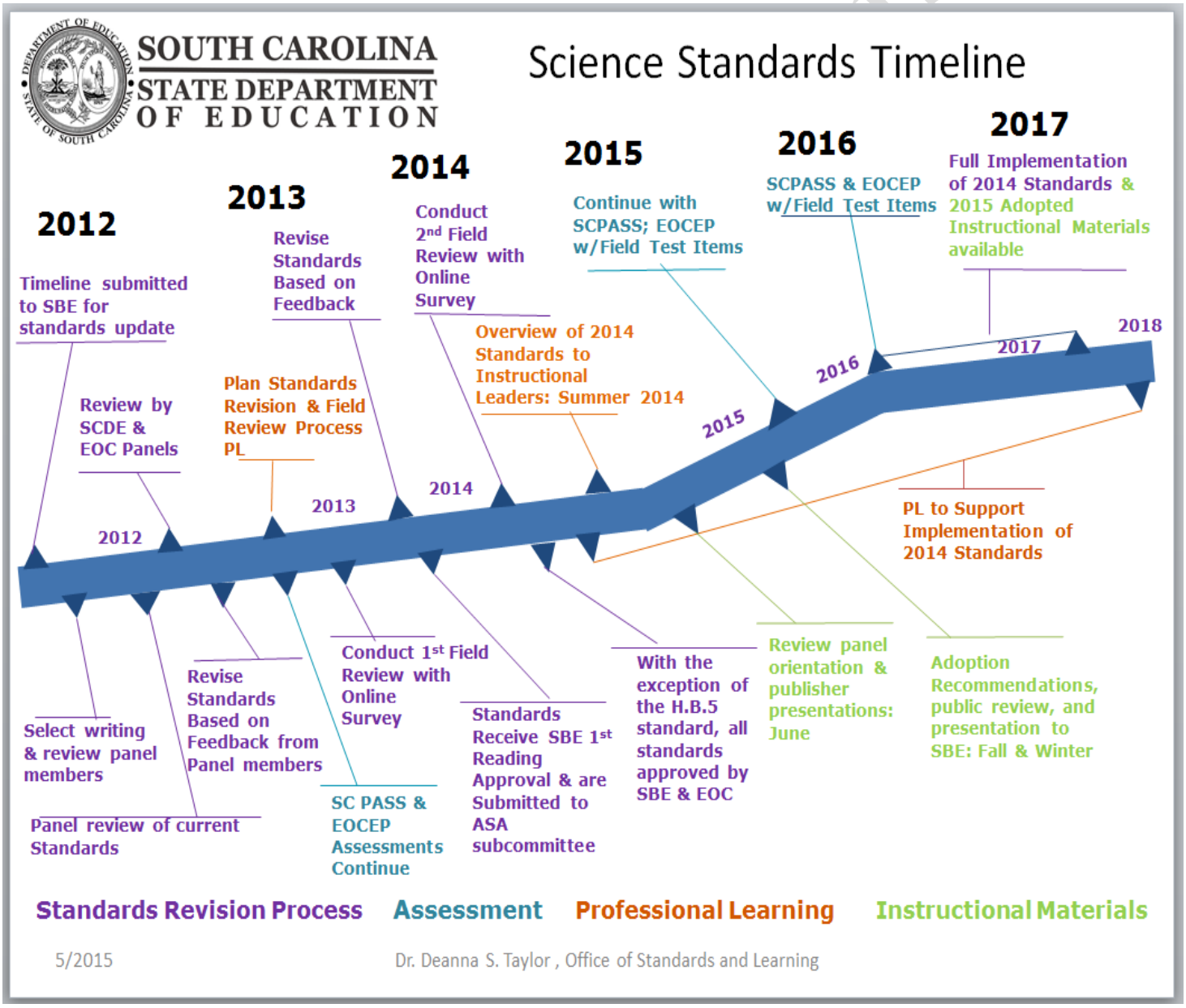
transformSC
tomorrow won't wait for our students

AN INITIATIVE OF SOUTH CAROLINA COUNCIL ON COMPETITIVENESS

SCIENCE STANDARDS TIMELINE

This timeline is used to illustrate the timeline for the standards revisions process, student assessment administration, provision of professional learning and the review and adoption of instructional materials. This timeline may be used with the science academic standards, science and engineering support document, and grade/content support documents to assist local districts, schools and teachers as they construct standards-based science curriculum, allowing them to add or expand topics they feel are important and to organize content to fit their students' needs and match available instructional materials.

The timeline in this document does not offer a sequence for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *Science Standards Timeline*, is not a curriculum.



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CROSSCUTTING CONCEPTS

Seven common threads or themes are presented in *A Framework for K-12 Science Education* (2012). These concepts connect knowledge across the science disciplines (biology, chemistry, physics, earth and space science) and have value to both scientists and engineers because they identify universal properties and processes found in all disciplines. These crosscutting concepts are:

1. Patterns
2. Cause and Effect: Mechanism and Explanation
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter: Flows, Cycles, and Conservation
6. Structure and Function
7. Stability and Change

These concepts should not to be taught in isolation but reinforced in the context of instruction within the core science content for each grade level or course.

SCIENCE AND ENGINEERING PRACTICES

In addition to the academic standards, each grade level or high school course explicitly identifies S*cience and Engineering Practice* standards, with indicators that are differentiated across grade levels and core areas. The term "practice" is used instead of the term "skill," to emphasize that scientists and engineers use skill and knowledge simultaneously, not in isolation. These eight science and engineering practices are:

1. Ask questions and define problems
2. Develop and use models
3. Plan and conduct investigations
4. Analyze and interpret data
5. Use mathematical and computational thinking
6. Construct explanations and design solutions
7. Engage in scientific argument from evidence
8. Obtain, evaluate, and communicate information

Students should engage in scientific and engineering practices as a means to learn about the specific topics identified for their grade levels and courses. It is critical that educators understand that the Science and Engineering Practices are *not* to be taught in isolation. There should *not* be a distinct "Inquiry" unit at the beginning of each school year. Rather, the practices need to be employed *within the content* for each grade level or course.

Additionally, an important component of all scientists and engineers' work is communicating their results both by informal and formal speaking and listening, and formal reading and writing. Speaking, listening, reading and writing is important not only for the purpose of sharing results, but because during the processes of reading, speaking, listening and writing, scientists and engineers continue to construct their own knowledge and understanding of meaning and implications of their research. Knowing how one's results connect to previous results and what those connections reveal about the underlying principles is an important part of the scientific discovery process. Therefore, students should similarly be reading, writing, speaking and listening throughout the scientific processes in which they engage.

For additional information regarding the development, use and assessment of the *2014 Academic Standards and Performance Indicators for Science* please see the official document that is posted on the SCDE science web page--- http://tinyurl.com/2014SCScience.

DECIPHERING THE STANDARDS

KINDERGARTEN
LIFE SCIENCE: EXPLORING ORGANISMS AND THE ENVIRONMENT

Standard K.L.2: The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

K.L.2A. Conceptual Understanding: The environment consists of many types of organisms including plants, animals, and fungi. Organisms depend on the land, water, and air to live and grow. Plants need water and light to make their own food. Fungi and animals cannot make their own food and get energy from other sources. Animals (including humans) use different body parts to obtain food and other resources needed to grow and survive. Organisms live in areas where their needs for air, water, nutrients, and shelter are met.

Performance Indicators: Students who demonstrate this understanding can:

K.L.2A.1 Obtain information to answer questions about different organisms found in the environment (such as plants, animals, or fungi).

K.L.2A.2 Conduct structured investigations to determine what plants need to live and grow (including water and light).

Figure 1: Example from the Kindergarten Standards

The code assigned to each performance indicator within the standards is designed to provide information about the content of the indicator. For example, the **K.L.2A.1** indicator decodes as the following--

- **K: The first part of each indicator denotes the grade or subject.** The example indicator is from Kindergarten. The key for grade levels are as follows—

  K: Kindergarten
  1: First Grade
  2: Second Grade
  3: Third Grade
  4: Fourth Grade
  5: Fifth Grade
  6: Sixth Grade
  7: Seventh Grade
  8: Eighth Grade
  H.B: High School Biology 1
  H.C: High School Chemistry 1
  H.P: High School Physics 1
  H.E: High School Earth Science

- **L: After the grade or subject, the content area is denoted by an uppercase letter.** The L in the example indicator means that the content covers Life Science. The key for content areas are as follows—
  - E: Earth Science
  - EC: Ecology
  - L: Life Science
  - P: Physical Science
  - S: Science and Engineering Practices

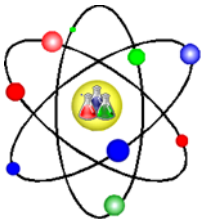
- **2: The number following the content area denotes the specific academic standard.** In the example, the 2 in the indicator means that it is within the second academic standard with the Kindergarten science content.

- **A: After the specific content standard, the conceptual understanding is denoted by an uppercase letter.** The conceptual understanding is a statement of the core idea for which students should demonstrate understanding. There may be more than one conceptual understanding per academic standard. The A in the example means that this is the first conceptual understanding for the standard. Additionally, the conceptual understandings are novel to the *2014 South Carolina Academic Standards and Performance Indicators for Science*.

- **1: The last part of the code denotes the number of the specific performance indicator.** Performance indicators are statements of what students can do to demonstrate knowledge of the conceptual understanding. The example discussed is the first performance indicator within the conceptual understanding.

CORE AREAS OF GRADE TWO

- Weather
- Properties of Solids and Liquids
- Exploring Pushes and Pulls
- Animals and Their Environments



GRADE TWO
SCIENCE AND ENGINEERING PRACTICES

NOTE: Scientific investigations should always be done in the context of content knowledge expected at this grade level. The standard describes how students should learn and demonstrate knowledge of the content outlined in the other standards.

Standard 2.S.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

2.S.1A. Conceptual Understanding: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.

Performance Indicators: Students who demonstrate this understanding can:

2.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.

2.S.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

2.S.1A.3 With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.

2.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.

2.S.1A.5 Use mathematical and computational thinking to (1) express quantitative observations using appropriate English or metric units, (2) collect and analyze data, or (3) understand patterns, trends and relationships.

2.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.

2.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.

2.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations using oral and written language.

2.S.1B. Conceptual Understanding: Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology.

Performance Indicators: Students who demonstrate this understanding can:

2.S.1B.1 Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem, and (6) communicate the results.

EARTH SCIENCE: WEATHER

Standard 2.E.2: The student will demonstrate an understanding of the daily and seasonal weather patterns.

2.E.2A. Conceptual Understanding: Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.

Performance Indicators: Students who demonstrate this understanding can:

2.E.2A.1 Analyze and interpret data from observations and measurements to describe local weather conditions (including temperature, wind, and forms of precipitation).

2.E.2A.2 Analyze local weather data to predict daily and seasonal patterns over time.

2.E.2A.3 Develop and use models to describe and compare the effects of wind (moving air) on objects.

2.E.2A.4 Obtain and communicate information about severe weather conditions to explain why certain safety precautions are necessary.

PHYSICAL SCIENCE: PROPERTIES OF SOLIDS AND LIQUIDS

Standard 2.P.3: The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

2.P.3A. Conceptual Understanding: Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.

Performance Indicators: Students who demonstrate this understanding can:

2.P.3A.1 Analyze and interpret data from observations and measurements to describe the properties used to classify matter as a solid or a liquid.

2.P.3A.2 Develop and use models to exemplify how matter can be mixed together and separated again based on the properties of the mixture.

2.P.3A.3 Conduct structured investigations to test how adding or removing heat can cause changes in solids and liquids.

2.P.3A.4 Construct scientific arguments using evidence from investigations to support claims that some changes in solids or liquids are reversible and some are not when heat is added or removed.

2.P.3B. Conceptual Understanding: Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.

Performance Indicators: Students who demonstrate this understanding can:

2.P.3B.1 Conduct structured investigations to answer questions about how the poles of magnets attract and repel each other.

2.P.3B.2 Analyze and interpret data from observations to compare the effects of magnets on various materials.

2.P.3B.3 Obtain and communicate information to exemplify the uses of magnets in everyday life.

PHYSICAL SCIENCE: EXPLORING PUSHES AND PULLS

Standard 2.P.4: The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.

2.P.4A. Conceptual Understanding: An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.

Performance Indicators: Students who demonstrate this understanding can:

2.P.4A.1 Analyze and interpret data from observations and measurements to compare the effects of different strengths and directions of pushing and pulling on the motion of an object.

2.P.4A.2 Develop and use models to exemplify the effects of pushing and pulling on an object.

2.P.4A.3 Construct explanations of the relationship between the motion of an object and the pull of gravity using observations and data collected.

2.P.4A.4 Conduct structured investigations to answer questions about the relationship between friction and the motion of objects.

2.P.4A.5 Define problems related to the effects of friction and design possible solutions to reduce the effects on the motion of an object.

LIFE SCIENCE: ANIMALS AND THEIR ENVIRONMENTS

Standard 2.L.5: The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

2.L.5A. Conceptual Understanding: There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.

Performance Indicators: Students who demonstrate this understanding can:

2.L.5A.1 Obtain and communicate information to classify animals (such as mammals, birds, amphibians, reptiles, fish, or insects) based on their physical characteristics.

2.L.5A.2 Construct explanations for how structures (including structures for seeing, hearing, grasping, protection, locomotion, and obtaining and using resources) of different animals help them survive.

2.L.5A.3 Construct explanations using observations and measurements of an animal as it grows and changes to describe the stages of development of the animal.

2.L.5B. Conceptual Understanding: Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways.

Performance Indicators: Students who demonstrate this understanding can:

2.L.5B.1 Obtain and communicate information to describe and compare how animals interact with other animals and plants in the environment.

2.L.5B.2 Develop and use models to exemplify characteristics of animals that help them survive in distinct environments (such as salt and freshwater, deserts, forests, wetlands, or polar lands).

2.L.5B.3 Analyze and interpret data from observations to describe how animals respond to changes in their environment (such as changes in food availability, water, or air).

2.L.5B.4 Construct scientific arguments to explain how animals can change their environments (such as the shape of the land or the flow of water).

GRADE TWO CROSSWALK FOR THE 2005 SOUTH CAROLINA SCIENCE ACADEMIC STANDARDS AND THE 2014 SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

ACKNOWLEDGEMENTS

SOUTH CAROLINA DEPARTMENT OF EDUCATION

The *Crosswalks for the South Carolina Academic Standards and Performance Indicators for Science* included in this document were developed under the direction of Dr. Julie Fowler, Deputy Superintendent, Division of College and Career Readiness and Cathy Jones Stork, Interim Director, Office of Standards and Learning.

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INTRODUCTION

This document, *Crosswalks for the 2005 South Carolina Science Academic Standards and the 2014 South Carolina Academic Standards and Performance Indicators for Science,* contains a comparison of the academic standards in science for the state's students in kindergarten through grade twelve.

HOW TO USE THE CROSSWALKS

This document may be used with the science academic standards, science and engineering support document, and grade/content support documents to assist local districts, schools and teachers as they construct standards-based science curriculum, allowing them to add or expand topics they feel are important and to organize content to fit their students' needs and match available instructional materials. 2005 and 2014 performance indicators that share similar content knowledge and skills that students should demonstrate to meet the grade level or high school course standards have been paired. These pairings have been organized into tables and are sequenced by the 2014 academic standards. The 2005 content indicators that do not match 2014 content have been placed at the end of each table.

The academic standards in this document are not sequenced for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *Crosswalks for the 2005 South Carolina Science Academic Standards and the 2014 South Carolina Academic Standards and Performance Indicators for Science,* is not a curriculum.

GRADE 2 SCIENCE CROSSWALK DOCUMENT

(***** The 2005 content indicators that do not match 2014 content have been placed at the end of each table.)

2005	2014	Comments
Standard (Science & Engineering Practices)		
2-1: The student will demonstrate an understanding of scientific inquiry, including the processes, skills, and mathematical thinking necessary to conduct a simple scientific investigation.	**2.S.1:** The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.	In 2005 this standard and these indicators were referred to as "scientific inquiry"
Conceptual Understanding		
	2.S.1A. The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.	
Performance Indicators		
2-1.1 Carry out simple scientific investigations to answer questions about familiar objects and events.	**2.S.1A.1** Ask and answer questions about the natural world using explorations, observations, or structured investigations.	
	2.S.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.	This is a new expectation in 2014 standards
2-1.1 Carry out simple scientific investigations to answer questions about familiar objects and events. **2-1.2** Use tools (including thermometers, rain gauges, balances, and measuring cups) safely, accurately, and appropriately when gathering specific data in US customary (English) and metric units of measurement.	**2.S.1A.3** With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.	Conducting structured investigations was a skill used with the 2005 standards, new expectations in the 2014 standards include, to test predictions and develop explanations, collect qualitative and quantitative data

2-1.3 Represent and communicate simple data and explanations through drawings, tables, pictographs, bar graphs, and oral and written language. **2-1.5** Use appropriate safety procedures when conducting investigations.		
2-1.4 Infer explanations regarding scientific observations and experiences.	**2.S.1A.4** Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.	This is a new expectation in 2014 standards
	2.S.1A.5 Use mathematical and computational thinking to (1) express quantitative observations using appropriate English or metric units, (2) collect and analyze data, or (3) understand patterns, trends and relationships.	This is a new expectation in 2014 standards
2-1.3 Represent and communicate simple data and explanations through drawings, tables, pictographs, bar graphs, and oral and written language.	**2.S.1A.6** Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.	Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, is a new expectation in 2014 standards
	2.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.	This is a new expectation in 2014 standards
	2.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations using oral and written language.	This is a new expectation in 2014 standards
	Conceptual Understanding	
	2.S.1B. Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of	

	iterative steps used to solve a problem and often leads to the development of a new or improved technology.	
	Performance Indicators	
	2.S.1B.1 Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem, and (6) communicate the results.	This is a new expectation in 2014 standards

2005	2014	Comments
	Standard (Earth Science)	
2-3: The student will demonstrate an understanding of daily and seasonal weather conditions.	**2.E.2:** The student will demonstrate an understanding of the daily and seasonal weather patterns.	
	Conceptual Understanding	
	2.E.2A. Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.	
	Performance Indicators	
2-3.2 Recall weather terminology (including temperature, wind direction, wind speed, and precipitation as rain, snow, sleet, and hail). **2-3.4** Carry out procedures to measure and record daily weather conditions (including temperature, precipitation amounts, wind speed as measured on the Beaufort scale, and wind direction as measured with a windsock or wind vane). **2-3.5** Use pictorial weather symbols to record observable sky conditions.	**2.E.2A.1** Analyze and interpret data from observations and measurements to describe local weather conditions (including temperature, wind, and forms of precipitation).	
2-3.3 Illustrate the weather conditions of different seasons.	**2.E.2A.2** Analyze local weather data to predict daily and seasonal patterns over time.	
2-3.1 Explain the effects of moving air as it interacts with objects.	**2.E.2A.3** Develop and use models to describe and compare the effects of wind (moving air) on objects.	This is a new expectation in 2014 standards
2-3.6 Identify safety precautions that one should take during severe weather conditions.	**2.E.2A.4** Obtain and communicate information about severe weather conditions to explain why certain safety precautions are necessary.	This is a new expectation in 2014 standards

2005	2014	Comments
	Standard (Physical Science)	
2-4: The student will demonstrate an understanding of the properties of matter and the changes that matter undergoes.	**2.P.3:** The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.	
	Conceptual Understanding	
	2.P.3A. Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.	
	Performance Indicators	
2-4.1 Recall the properties of solids and liquids.	**2.P.3A.1** Analyze and interpret data from observations and measurements to describe the properties used to classify matter as a solid or a liquid.	This is a new expectation in 2014 standards
2-4.4 Recognize that different materials can be mixed together and then separated again.	**2.P.3A.2** Develop and use models to exemplify how matter can be mixed together and separated again based on the properties of the mixture.	This is a new expectation in 2014 standards
2-4.3 Explain how matter can be changed in ways such as heating or cooling, cutting or tearing, bending or stretching.	**2.P.3A.3** Conduct structured investigations to test how adding or removing heat can cause changes in solids and liquids.	
2-4.2 Exemplify matter that changes from a solid to a liquid and from a liquid to a solid.	**2.P.3A.4** Construct scientific arguments using evidence from investigations to support claims that some changes in solids or liquids are reversible and some are not when heat is added or removed.	Constructing scientific arguments using evidence from investigations to support claims is a new expectation in 2014 standards
	Conceptual Understanding	
	2.P.3B. Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.	
	Performance Indicators	

2-5.1 Use magnets to make an object move without being touched. **2-5.2** Explain how the poles of magnets affect each other (that is, they attract and repel one another).	**2.P.3B.1** Conduct structured investigations to answer questions about how the poles of magnets attract and repel each other.
2-5.3 Compare the effect of magnets on various materials.	**2.P.3B.2** Analyze and interpret data from observations to compare the effects of magnets on various materials.
2-5.4 Identify everyday uses of magnets	**2.P.3B.3** Obtain and communicate information to exemplify the uses of magnets in everyday life.

2005	2014	Comments
	Standard (Physical Science)	
3-5: The student will demonstrate an understanding of how motion and sound are affected by a push or pull on an object and the vibration of an object.	**2.P.4:** The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.	Moved down to 2nd grade from 3rd grade
	Conceptual Understanding	
	2.P.4A. An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.	
	Performance Indicators	
3-5.3 Explain how the motion of an object is affected by the strength of a push or pull and the mass of the object.	**2.P.4A.1** Analyze and interpret data from observations and measurements to compare the effects of different strengths and directions of pushing and pulling on the motion of an object.	This is a new expectation in 2014 standards
	2.P.4A.2 Develop and use models to exemplify the effects of pushing and pulling on an object.	This is a new expectation in 2014 standards
3-5.4 Explain the relationship between the motion of an object and the pull of gravity.	**2.P.4A.3** Construct explanations of the relationship between the motion of an object and the pull of gravity using observations and data collected.	
	2.P.4A.4 Conduct structured investigations to answer questions about the relationship between friction and the motion of objects.	This is a new expectation in 2014 standards
	2.P.4A.5 Define problems related to the effects of friction and design possible solutions to reduce the effects on the motion of an object.	This is a new expectation in 2014 standards

2005	2014	Comments
	Standard (Life Science)	
2-2: The student will demonstrate an understanding of the needs and characteristics of animals as they interact in their own distinct environments.	**2.L.5:** The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
	Conceptual Understanding	
	2.L.5A. There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.	
	Performance Indicators	
2-2.2 Classify animals (including mammals, birds, amphibians, reptiles, fish, and insects) according to their physical characteristics.	**2.L.5A.1** Obtain and communicate information to classify animals (such as mammals, birds, amphibians, reptiles, fish, or insects) based on their physical characteristics.	
	2.L.5A.2 Construct explanations for how structures (including structures for seeing, hearing, grasping, protection, locomotion, and obtaining and using resources) of different animals help them survive.	This is a new expectation in 2014 standards
2-2.5 Illustrate the various life cycles of animals (including birth and the stages of development).	**2.L.5A.3** Construct explanations using observations and measurements of an animal as it grows and changes to describe the stages of development of the animal.	
	Conceptual Understanding	
	2.L.5B. Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways.	

Performance Indicators		
2-2.1 Recall the basic needs of animals (including air, water, food, and shelter) for energy, growth, and protection. **2-2.4** Summarize the interdependence between animals and plants as sources of food and shelter.	**2.L.5B.1** Obtain and communicate information to describe and compare how animals interact with other animals and plants in the environment.	
2-2.3 Explain how distinct environments throughout the world support the life of different types of animals.	**2.L.5B.2** Develop and use models to exemplify characteristics of animals that help them survive in distinct environments (such as salt and freshwater, deserts, forests, wetlands, or polar lands).	
	2.L.5B.3 Analyze and interpret data from observations to describe how animals respond to changes in their environment (such as changes in food availability, water, or air).	This is a new expectation in 2014 standards
	2.L.5B.4 Construct scientific arguments to explain how animals can change their environments (such as the shape of the land or the flow of water).	This is a new expectation in 2014 standards

CONTENT SUPPORT GUIDE
FOR GRADE TWO
SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

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SOUTH CAROLINA DEPARTMENT OF EDUCATION

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INTRODUCTION

Local districts, schools and teachers may use this document to construct standards-based science curriculum, allowing them to add or expand topics they feel are important and to organize content to fit their students' needs and match available instructional materials. The support document includes essential knowledge, extended knowledge, connections to previous and future knowledge, and assessment recommendations.

FORMAT OF THE CONTENT SUPPORT GUIDE

The format of this document is designed to be structurally uniformed for each of the academic standards and performance indicators. For each, you will find the following sections--

- **Standard**
  - This section provides the standard being explicated.
- **Conceptual Understanding**
  - This section provides the overall understanding that the student should possess as related to the standard. Additionally, the conceptual understandings are novel to the *2014 South Carolina Academic Standards and Performance Indicators for Science*.
- **Performance Indicator**
  - This section provides a specific set of content with an associated science and engineering practice for which the student must demonstrate mastery.
- **Assessment Guidance**
  - This section provides guidelines for educators and assessors to check for student mastery of content utilizing interrelated science and engineering practices.
- **Previous and Future Knowledge**
  - This section provides a list of academic content along with the associated academic standard that students will have received in prior or will experience in future grade levels. Please note that the kindergarten curriculum support document does not contain previous knowledge. Additionally, although the high school support document may not contain future knowledge, this section may list overlapping concepts from other high school science content areas.
- **Essential Knowledge**
  - This section illustrates the knowledge of the content contained in the performance indicator for which it is fundamental for students to demonstrate mastery.
- **Extended Knowledge**
  - This section provides educators with topics that will enrich students' knowledge related to topics learned with the explicated performance indicator.
- **Science and Engineering Practices**
  - This section lists the specific science and engineering practice that is paired with the content in the performance indicator. Educators should reference the chapter on this specific science and engineering practice in the *Science and Engineering Practices Support Guide.*

GRADE 2 SCIENCE CONTENT SUPPORT GUIDE

Standard
2.E.2: The student will demonstrate an understanding of the daily and seasonal weather patterns.

Conceptual Understanding
2.E.2A. Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.

Performance Indicator
2.E.2A.1 Analyze and interpret data from observations and measurements to describe local weather conditions (including temperature, wind, and forms of precipitation).

Assessment Guidance
The objective of this indicator is to *analyze and interpret data* from observations to describe local weather conditions. Therefore, the primary focus of assessment should be for students to make observations, measurements, and perform investigations related to the temperature (by reading numbers on a thermometer {ºF}), wind, and forms of precipitation (i.e. thermometer and rain gauge). This could include but is not limited to students creating an observation journal including the current conditions of local weather. Students can make predictions based on the analysis of their data.

In addition to *analyzing and interpreting data*, students should *ask questions; develop and use models; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information; construct devices or design solutions*.

Previous and Future Knowledge
- K.E.3A.1 Weather patterns, local weather conditions and weather patterns
- 4.E.2B.1 Weather patterns, local weather conditions and predict changes in weather
- 6.E.2B.1 Weather (wind speed/direction, temperature, humidity, cloud types, and air pressure)
- 6.E.2B.2 Air masses, including thunderstorms, hurricanes and tornadoes

Essential Knowledge
There are different types of weather conditions. Weather conditions can be described using specific weather terminology.

Temperature
- How hot or cold the air is at a given time
- Each day the high and low temperatures are recorded
- A thermometer can be used to record temperature in degrees Fahrenheit or degrees Celsius

Precipitation
- The type of water falling from the clouds is rain, snow, sleet, or hail.
- Rain gauge is used to measure rainfall in centimeters/inches.

Wind direction
- The direction from which the wind blows.

- The wind sock or wind vane is used to determine wind direction.

Wind speed

- How fast or slow the wind blows
- Wind speed is recorded in miles per hour (mph)/kilometers per hour (km/h).

NOTE TO TEACHER: This may be an opportunity for students to collect, organize, and represent data with up to four categories using picture graphs and bar graphs with a single-unit scale.

Extended Knowledge

- Students should be able to use pictorial weather symbols to analyze and describe weather patterns and conditions, and also use pictorial weather symbols to justify observations.
- Students should be familiar with the Beaufort Wind Scale for reporting wind speed.

Science and Engineering Practices

S.1.A.4

Standard

2.E.2: The student will demonstrate an understanding of the daily and seasonal weather patterns.

Conceptual Understanding

2.E.2A. Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events

Performance Indicator

2.E.2A.2 Analyze local weather data to predict daily and seasonal patterns over time.

Assessment Guidance

The objective of this indicator is to *analyze local weather data* from observations to predict daily and seasonal patterns over time. Therefore, the primary focus of assessment should be for students to identify trends, patterns, and relationships related to the seasonal patterns of a particular area. Students should be able to predict daily weather conditions related to that specific season. This could include but is not limited to students creating an observation journal of seasonal and daily weather changes and predicting the weather conditions of that area based on their knowledge of the seasonal changes.

In addition to *analyzing data*, students should *ask questions; develop and use models; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information; construct devices or design solutions.*

Previous and Future Knowledge

- K.E.3. Daily and seasonal weather patterns
- 4.E.2B.1 Local weather conditions, changes in weather over time
- 6.E.2B.1 Weather (wind speed/direction, temperature, humidity, cloud types, and air pressure)

Essential Knowledge

Each season has different weather patterns, and there are four basic seasons: winter, spring, summer, and fall/autumn. Descriptions of the seasons are as follows:

- *Winter* The weather may be cold or freezing; there may be rain, snow, or sleet

- *Spring* The weather starts to get warmer; there may be a lot of rain
- *Summer* The weather is often hot and dry; there may be little or no rain
- *Fall/Autumn* The weather starts to get cooler; there may be little or no rainfall

NOTE: For students moving into our communities that are not native to South Carolina, they may come from areas that do not experience the four seasons in the same months that we do. Some areas experience seasons of rain and little/no rain and some areas only experience two definite seasons.

NOTE TO TEACHER: This may be an opportunity for students to collect, organize, and represent data with up to four categories using picture graphs and bar graphs with a single-unit scale.

Extended Knowledge

- Measure air pressure or humidity conditions, to use other weather instruments, or use the Beaufort Wind Scale.
- Understand seasons form the astronomy perspective-revolution around the sun and tilt of Earth's axis
- Keep track of weather using various media sources.

Science and Engineering Practices
S.1.A.4

Standard
2.E.2: The student will demonstrate an understanding of the daily and seasonal weather patterns.

Conceptual Understanding
2.E.2A. Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.

Performance Indicator
2.E.2A.3 Develop and use models to describe and compare the effects of wind (moving air) on objects.

Assessment Guidance
The objective of this indicator is to *develop and use models* to describe and compare the effects of wind (moving air) on objects. Therefore, the primary focus of assessment should be for students to *develop a model* of how air moves objects and compare the effects. This could include but is not limited to students creating a model of the coastline (sand) or land (soil and/or grass) and showing how wind (hair dryer) affects the land, you could also add a variety of sizes of rocks to see additional effects.

In addition to *developing and using models*, students should *ask questions; analyze and interpret data; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information; construct devices or design solutions.*

Previous and Future Knowledge

- 4.E.2B.1, 6.E.2B.1 Wind speed/direction
- 6.E.2B.2 Air masses
- 6.E.2B.3 Global winds

Essential Knowledge
When air interacts with objects, the objects move.

- Examples of things that are affected by moving air are kites, leaves, or sailboats.
- When air interacts with these objects, they move.
- If there is no moving air, then neither the kite, leaves, or sailboat will move.
- Moving air can also be called *wind*.
-

Extended Knowledge

- Measure the effects of moving air on objects.

Science and Engineering Practices
S.1.A.2

Standard
2.E.2: The student will demonstrate an understanding of the daily and seasonal weather patterns.

Conceptual Understanding
2.E.2A. Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.

Performance Indicator
2.E.2A.4 Obtain and communicate information about severe weather conditions to explain why certain safety precautions are necessary.

Assessment Guidance
The objective of this indicator is to *obtain and communicate* information about severe weather conditions such as floods, lightning storms, hurricanes, tornadoes, and thunderstorms. Therefore, the primary focus of assessment should be for students to obtain and evaluate informational texts, observations, or data collected to explain why certain safety precautions are necessary during these types of severe weather. This could include but is not limited to students reading books and articles about severe weather and creating digital media (i.e. movie) that details each safety precaution and why it is important.

In addition to *obtaining and communicating information*, students should *ask questions; analyze and interpret data*; *develop and use models; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanation; construct devices or design solutions.*

Previous and Future Knowledge

- 4.E.2B.2 Impact of severe weather phenomena

Essential Knowledge
There are certain safety precautions that should be taken during severe weather conditions. Some examples of severe weather conditions and the associated safety precautions that are most common to South Carolina are listed below:

- *Flood* - Stay on high ground
- *Lightning storms* - Stay indoors or low to the ground

- *Tornado* - Stay indoors away from windows; go to the basement or a windowless room
- *Thunderstorm* - Do not stand under a tree; stay away from water (pools, puddles, bathtubs)
- *Hurricane* –
- Stay indoors away from windows; follow an evacuation route to a safer place away from the hurricane's path

Note: The above safety precautions are general rules to follow when not at school. At school, students need to know to follow emergency procedures as directed by an adult. Students need to understand why we take the safety precautions listed above.

Extended Knowledge

- Identify safety precautions of other types of severe weather conditions that are not typical of South Carolina
- How are the examples of severe weather created
- Students devise and implement a plan with their families for safety and discuss with classmates.

Science and Engineering Practices

S.1.A.8

Standard

2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

Conceptual Understanding

2.P.3A Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.

Performance Indicator

2.P.3A.1 Analyze and interpret data from observations and measurements to describe the properties used to classify matter as a solid or a liquid.

Assessment Guidance

The objective of this indicator is to *analyze and interpret* data from observations and measurements about the properties of solids and liquids. Therefore, the primary focus of assessment should be for students to *analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings* in order to describe properties that are used to classify of solids and liquids. This could include but is not limited to students using written observations and drawings from conducted experiments to classify a set of objects as solid or liquid and to construct an explanation for classification.

In addition to *analyzing and interpreting* data, students should be asked to ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.

Previous and Future Knowledge

- K.P.4 Observable properties
- 3.P.2 Properties of Matter
- 5.P.2 Mixtures & Solutions

Essential Knowledge

Matter can be described based on the observed and measured properties of solids and liquids.

Liquid

- A liquid is a form of matter that does not have its own shape.
- A liquid takes the shape of the container it is in.
- A liquid can flow, be poured, or spilled.
- A liquid can change to a solid by freezing, for example, water to ice cubes.

Solids

- A solid is the only form of matter that has its own shape.
- Some examples of solids are chairs, rocks, or tables.
- Some properties of solids are color, shape, size, weight, texture, buoyancy (sinks or floats), hardness, and magnetism.
-

NOTE TO TEACHER: This may be an opportunity for students to draw conclusions from t-charts, object graphs, picture graphs, and bar graphs.

Extended Knowledge

- Liquids can be poured to fill containers to a measurable level.
- Heating or cooling can cause a substance to change. Some changes are reversible, such as melting and freezing. Some changes are irreversible, such as baking a cake or burning fuel.

Science and Engineering Practices

S.1A.4

Standard

2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

Conceptual Understanding

2.P.3A Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.

Performance Indicator

2.P.3A.2 Develop and use models to exemplify how matter can be mixed together and separated again based on the properties of the mixture.

Assessment Guidance

The objective of this indicator is to *develop and use models* to exemplify how matter can be mixed together and separated again based on properties of the mixture. Therefore, the primary focus of assessment should be for students to construct 2-D drawings or 3-D models to show examples of materials that can be mixed together and separated again. This could include but is not limited to students using observations from investigations, such as mixing together a collection of items, such as pennies, buttons and rocks, and then separating the items, to develop models that they can use to show examples of how the different materials were mixed and then separated.

In addition to *developing and using models*, students should be asked to ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; obtain, evaluate, and communicate information; and construct devices or design solutions.

Previous and Future Knowledge

- K.P.4 Observable properties
- 3.P.2 Properties of Matter
- 5.P.2 Mixtures & Solutions

Essential Knowledge

Mixtures are composed of two or more substances that are mixed together but can be separated from each other.

- For example, a salad may contain lettuce, tomatoes, and cucumbers. The ingredients can be mixed all together and then separated out again.
- Another example may be taking a handful of different coins or buttons and separating them out into the individual types of coins or buttons.
- The properties of mixtures relate to the physical properties of the substances combined.

Extended Knowledge

- A solution is a type of mixture in which one substance is dissolved in another, such as sugar water.

Science and Engineering Practices

S.1A.2

Standard

2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

Conceptual Understanding

2.P.3A Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.

Performance Indicator

2.P.3A.3 Conduct structured investigations to test how adding or removing heat can cause changes in solids and liquids.

Assessment Guidance

The objective of this indicator is to *conduct investigations* to test how adding or removing heat can cause changes in solids and liquids; therefore, the primary focus of assessment should be to conduct structured investigations, with teacher support, to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form while using appropriate safety procedures to determine how solids and liquids are changed by adding or removing heat. This could include but is not limited to students making predictions and conducting investigations about how water will react when heat is removed and added.

In addition to *conducting structured investigations*, students should be asked to ask questions; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.

Previous and Future Knowledge

- 3.P.3 Solid, liquid, gas
- 3.P.2 Melting, freezing, boiling
- 5.P.2 Dissolving rate, evaporation

Essential Knowledge

Adding or removing heat can cause changes in solids and liquids.

When heat is added…

- a solid may melt and change to a liquid
- solid ice *melts* and changes to liquid water
- solid butter, chocolate, popsicles, or ice cream will melt into a liquid

When heat is removed…

- solids and liquids cool
- liquids can freeze and change to a solid (ice)
- melted wax will harden into the shape of its container

*SCIENTIFIC TOOLS used to gather data and make measurements related to adding or removing heat to solids and liquids could include a solar cooker (a device which uses the energy of direct sunlight to heat or cook a food or drink), hot plate (teacher demonstration only), and a cooler or freezer.

Extended Knowledge

- Liquids other than water can freeze and then melt.
- When liquids freeze, they will freeze into the shape of the container.
- Water expands when it freezes.

Science and Engineering Practices

S.1A.3

Standard

2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

Conceptual Understanding

2.P.3A Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.

Performance Indicator

2.P.3A.4 Construct scientific arguments using evidence from investigations to support claims that some changes in solids or liquids are reversible and some are not when heat is added or removed.

Assessment Guidance

The objective of this indicator is to *construct arguments using evidence* from investigations to support claims that some changes in solids or liquids are reversible and some are not when heat is added or removed; therefore,

the primary focus of assessment should be to *construct scientific arguments to support claims or explanations using evidence from observations or data collected* to show that changes to solids and liquids can be reversible or irreversible when heat is added or removed. This could include but is not limited to students conducting investigations as well as obtaining information from various sources (videos, informational texts) to determine if adding or removing heat is reversible in different cases, such as adding heat to bake cookies, adding heat to melt ice, and removing heat to freeze water. Students will use the outcomes of these investigations as evidence to support claims about whether the changes made by cooking, melting and freezing are reversible or irreversible.

In addition *constructing arguments using evidence*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; construct explanations; obtain, evaluate, and communicate information; and construct devices or design solutions.*

Previous and Future Knowledge

- K.P.4 Observable properties
- 3.P.3 Solid, liquid, gas
- 3.P.2 Melting, freezing, boiling
- 5.P.2 Properties of matter

Essential Knowledge

Matter can change from a solid to a liquid and a liquid to a solid.

Solid to a liquid

- By heating—for example solid butter, chocolate, popsicles, or ice cream will melt into a liquid when heat is added.

Liquid to a solid

- By cooling—for example melted wax will harden into the shape of its container when heat is removed.

Some of these changes are reversible, such as removing heat to freeze water into ice is reversed when heat is added to melt ice back into water.

Some of these changes are irreversible, such as adding heat to liquid cake batter to cook it into a solid cake; this cannot be reversed by removing the heat.

*SCIENTIFIC TOOLS used to gather data and make measurements related to adding or removing heat to solids and liquids could include a solar cooker (a device which uses the energy of direct sunlight to heat or cook a food or drink), hot plate (teacher demonstration only), and a cooler or freezer.

Extended Knowledge

- Research or investigate changes from solids to gases or liquids to gases to determine if they are reversible or not when heat is added or removed

Science and Engineering Practices

S.1A.7

Standard

2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

Conceptual Understanding
2.P.3B Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.

Performance Indicator
2.P.3B.1 Conduct structured investigations to answer questions about how the poles of magnets attract and repel each other.

Assessment Guidance
The objective of this indicator is to *conduct structured investigations* to answer questions about how the poles of magnets attract and repel each other. Therefore, the primary focus of assessment should be for students to *conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to make qualitative observations and take nonstandard measurements, and (4) record and represent data in an appropriate form while using appropriate safety procedures to answer questions* about how the poles of magnets attract and repel each other. This could include but is not limited to students generating questions, making predictions, and investigating to determine how magnets react to each other when like poles and different poles are positioned near each other.

In addition to *conducting structured investigations*, students should be asked to ask questions; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.

Previous and Future Knowledge
- K.P.4 Magnetic attraction
- 3.P.3 Electromagnet
- 5.P.5 Magnetism

Essential Knowledge
The poles of magnets attract and repel each other. A magnet has two poles, one on each end.
- These poles are called the North pole (N) or the South pole (S).
- If the poles that are alike (North to North or South to South) are put together, they repel or push away.
- If the poles that are different (North to South or South to North) are put together, they attract or stick together.
- Some magnets, for example ring magnets, do not have the (N) or the (S) marked on them but they do have two poles that are either located on the top or bottom of the magnet.
- The poles can be determined by placing the magnets together.
- If they stay together then the poles are opposite but if they push away from each other the poles are alike.

*SCIENTIFIC TOOLS used to investigate the poles of magnets (horseshoe magnets, bar magnets, ring magnets, cow magnets, iron filings)

Extended Knowledge
- Magnetic force (pushes and pulls) can be created by magnets
- The magnetic force is invisible and is called magnetism.

Standard
2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

Conceptual Understanding
2.P.3B Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.

Performance Indicator
2.P.3B.2 Analyze and interpret data from observations to compare the effects of magnets on various materials.

Assessment Guidance
The objective of this indicator is to *analyze and interpret* data from observations to compare the effects of magnets on various materials. Therefore, the primary focus of assessment should be for students to analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings in order to compare the effects of magnets on a variety of materials. This could include but is not limited to students using written observations and drawings from investigations to compare how magnets affect materials, such as pencils, nails, paper clips, erasers, and plastic.

In addition to *analyzing and interpreting* data, students should be asked to ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.

Previous and Future Knowledge
- K.P.4 Magnetic attraction
- 3.P.3 Electromagnet
- 5.P.5 Magnetism

Essential Knowledge
Magnets can make an object move without touching the object. Other properties of magnets are:
- A magnet is solid material that attracts iron or products that contain iron like steel.
- A magnet can pull objects if the object contains iron.
- Some metals, such as aluminum, do not contain iron and are not attracted to magnets.
- The magnet pulls the object using its *magnetic force*. This magnetic force cannot be seen but it can be observed when the magnet moves the object without touching it.

NOTE TO TEACHER: This may be an opportunity for students to draw conclusions from t-charts, object graphs, picture graphs, and bar graphs.

*****SCIENTIFIC TOOLS used to compare the effects of magnets (horseshoe magnets, bar magnets, cow magnets, ring magnets, iron filings)

Extended Knowledge

- Objects do not have to touch to have magnetic attraction.
- Electromagnets create a magnetic field using electrical current.

Science and Engineering Practices

S.1A.4

Standard

2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

Conceptual Understanding

2.P.3B Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.

Performance Indicator

2.P.3B.3 Obtain and communicate information to exemplify the uses of magnets in everyday life.

Assessment Guidance

The objective of this indicator is to *obtain and communicate information* to exemplify the uses of magnets in everyday life. Therefore, the primary focus of assessment should be for students to obtain and communicate information from a variety of sources (informational texts, observations, data collected, or discussions) to provide different examples of everyday objects that use magnets. This could include but is not limited to students conducting research into the different uses of magnets as well as investigations into everyday devices that use magnets (such as compasses, speakers, toys, cabinet doors, magnetic tipped screwdrivers, refrigerator magnets, etc…) and presenting the results of their research using different media.

In addition to *analyzing and interpreting* data, students should be asked to ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.

Previous and Future Knowledge

- K.P.4 Magnetic attraction
- 3.P.3 Electromagnet
- 5.P.5 Magnetism

Essential Knowledge

Magnets are used in a variety of different everyday devices. These include but are not limited to:

- Speakers
- Compasses
- Toys (such as toy wooden trains)
- Magnets used to hold up notes
- Magnets used to hold cabinet doors closed
- Screwdrivers with magnetized tips

*SCIENTIFIC TOOLS used to explore devices that use magnets (such as those listed above)

Extended Knowledge

- Electromagnets are used in doorbells and to pick up scrap metal in metal recycling centers.

Science and Engineering Practices

S.1A.8

Standard

2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.

Conceptual Understanding

2.P.4A An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.

Performance Indicator

2.P.4A.1 Analyze and interpret data from observations and measurements to compare the effects of different strengths and directions of pushing and pulling on the motion of an object.

Assessment Guidance

The objective of this indicator is to *analyze and interpret* data from observations and measurements to compare the effects of different strengths and directions of pushing and pulling on the motion of an object. Therefore, the primary focus of assessment should be for students to *analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings* in order to compare the effects of different strengths and directions of pushing and pulling on the motion of an object. This could include but is not limited to students recording observations of different strengths and directions of pushes and pulls on objects and how these differences affect the motion of the objects. Students could record and measure the movement of the object and analyze the data as they look for patterns.

In addition to *analyzing and interpreting* data from observations and measurements, students should *ask questions and plan and carry out investigations, analyze and interpret data and use mathematics and computational thinking, engage in argument from evidence and construct explanations, develop and use models, construct devices or design solutions.*

Previous and Future Knowledge

- 5.P.5 Motion of an object, friction

Essential Knowledge

Both the strength of a push or pull and the direction of a push or pull can affect the motion of an object. Pushes and pulls can make objects move faster, slower, stop, or change directions.

- If the strength of a push or pull increases, an object will move faster. If the strength of a push or pull decreases, an object will move slower.
- Heavier objects will move slower than lighter objects if the push or pull is the same for both.
- If a push or a pull is applied to a moving object it can change the direction and or speed of the object.
- If the push or pull is in a direction that is not the direction the object is moving, it will change direction.
- If the push or pull is in the same direction as the moving object, the object will speed up.

- If the push or pull is in the opposite direction as the moving object, the object will slow down or stop.
- Magnetism, gravity, and friction are different types of pushes or pulls that can affect motion.

NOTE TO TEACHER: This may be an opportunity for students to draw conclusions from t-charts, object graphs, picture graphs, and bar graphs.

*SCIENTIFIC TOOLS used to measure force (magnets, rulers, measuring tapes, meter sticks)

Extended Knowledge

- The mass of the moving object will have an effect on its motion and how easy or difficult it is to change its speed and/or direction.

Science and Engineering Practices
S.1A.4

Standard
2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.

Conceptual Understanding
2.P.4A An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.

Performance Indicator
2.P.4A.2 Develop and use models to exemplify the effects of pushing and pulling on an object.

Assessment Guidance
The objective of this indicator is to *develop and use models* to exemplify the effects of pushing and pulling on an object. Therefore, the primary focus of assessment should be for students to *develop and use models to understand or represent phenomena, processes, and relationships and communicate ideas to others* in order to represent examples of how different strengths and directions of pushes and pulls will affect the movement of an object. This could include but is not limited to students using information from observations and investigations to draw simple diagrams and construct models that illustrate the effects of pushing and pulling on an object.

In addition to *developing and using models,* students should *ask questions and plan and carry out investigations, analyze and interpret data and use mathematics and computational thinking, engage in argument from evidence and construct explanations, develop and use models, construct devices or design solutions.*

Previous and Future Knowledge

- 5.P.5 Motion of an object

Essential Knowledge
Both the strength of a push or pull and the direction of a push or pull can affect the motion of an object. Pushes and pulls can make objects move faster, slower, stop, or change directions. The following are true on a flat surface…

- If the strength of a push or pull increases, an object will move faster. If the strength of a push or pull decreases, an object will move slower.
- Heavier objects will move slower than lighter objects if the push or pull is the same for both.
- If a push or a pull is applied to a moving object it can change the direction and or speed of the object.
- If the push or pull is in a direction that is not the direction the object is moving, it will change direction.
- If the push or pull is in the same direction as the moving object, the object will speed up.
- If the push or pull is in the opposite direction as the moving object, the object will slow down or stop.
- Magnetism, gravity, and friction are different types of pushes or pulls that can affect motion.

Extended Knowledge

- Investigate how mass effects the pushing and pulling of objects

Science and Engineering Practices

S.1A.2

Standard

2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.

Conceptual Understanding

2.P.4A An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.

Performance Indicator

2. P.4A.3 Construct explanations of the relationship between the motion of an object and the pull of gravity using observations and data collected.

Assessment Guidance

The objective of this indicator is to *construct explanations* of the relationship between the motion of an object and the pull of gravity using observations and data collected. Therefore, the primary focus of assessment should be for students to construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams to construct an evidence-based explanation for the effect of gravity on the motion of an object. This could include but is not limited to students testing various objects with similar size, shape, and mass, releasing them at various heights, timing how long it takes to reach the surface, and recording the data. Students will use the data from their investigations to construct an explanation that describes the cause and effect relationship between pull of gravity and the motion of the objects.

In addition to *constructing explanations*, students should be asked to ask questions and plan and carry out investigations, analyze and interpret data and use mathematics and computational thinking, engage in argument from evidence, develop and use models, construct devices or design solutions.

Previous and Future Knowledge

- 5.P.5 Motion of an object

Essential Knowledge
The pull of Earth's gravity causes object to fall towards the Earth. If things go up on Earth, gravity pulls them down. Things fall to Earth because they are pulled by Earth's gravity. The pull of gravity is everywhere on Earth. The pull of gravity holds things down on Earth all the time. No matter whether an object is dropped or thrown, it will always fall toward the Earth's surface unless there is a push or pull stronger than the pull of the Earth's gravity.

Extended Knowledge
- Investigate how fast objects fall or how mass and/or distance of objects affect the strength of the pull of gravity.

Science and Engineering Practices
S.1A.6

Standard
2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.

Conceptual Understanding
2.P.4A An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.

Performance Indicator
2.P.4A.4 Conduct structured investigations to answer questions about the relationship between friction and the motion of objects.

Assessment Guidance
The objective of this indicator is to *conduct structured investigations* to answer questions about the relationship between friction and the motion of objects. Therefore, the primary focus of assessment should be for students, with teacher guidance, to conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form, using appropriate safety procedures to answer questions about how friction affects the motion of an object. This could include but is not limited to students conducting investigations into the motion of objects across surfaces with different textures and using the outcome of their investigations to answer questions about how the texture of the surface affects the motion of the object.

In addition to *conducting structured investigations*, students should be asked to analyze and interpret data and use mathematics and computational thinking, engage in argument from evidence and construct explanations, develop and use models, and construct devices or design solutions.

Previous and Future Knowledge
- 5.P.5 Motion of an object

Essential Knowledge
An object sliding across a surface or sitting on a slope experiences a pull due to friction on the object because the surface opposes the object's motion. Friction is a pull that acts against motion. The following influence the effect of friction:
Texture of the surface

- *Rough surfaces* tend to create more friction.
- *Smooth surfaces* tend to create less friction.

Lubrication

- *Lubrication*, for example oil or grease, reduces the effects of friction.
- Without lubrication, moving parts of machines would slow down or stop very quickly.

Extended Knowledge

- Research types of tires used in auto racing versus other vehicles
- Research why friction or lack of friction is important in the Olympics
- Research how friction occurs between solids and solids, solids and liquids, solids and gases, liquids and liquids and liquids and gases.
- The amount of surface area affects the impact of friction on a moving object under the following circumstances: air resistance (such as the size of a parachute) or the resistance of an object as it glides through water (such as a boat).
- The amount of surface area in contact usually does not affect friction between two solids.

Science and Engineering Practices
S.4A.3

Standard
2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.

Conceptual Understanding
2.P.4A An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.

Performance Indicator
2. P.4A.5 Define problems related to the effects of friction and design possible solutions to reduce the effects on the motion of an object.

Assessment Guidance
The objective of this indicator is to *define* problems related to the effects of friction on the motion of an object, and to *design* possible solutions to reduce the effects. Therefore, the primary focus of assessment should be to (1) define problems related to the effect of friction on the motion of an object, (2) ask questions about the criteria and constraints of possible devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem, and (6) communicate the results of a devices or solution to reduce the effects of friction on the motion of an object. This could include but is not limited to students defining a problem related to something that is being slowed by friction, such as rolling a toy car across different surfaces outside, and designing a solution that will allow the toy car to move faster as a result of a reduction in the effect of friction.

In addition to *defining problems and designing solutions*, students should be asked to ask questions and plan and carry out investigations, analyze and interpret data and use mathematics and computational thinking, engage in argument from evidence and construct explanations.

Previous and Future Knowledge

- 5.P.5A.4 Friction

Essential Knowledge

An object sliding across a surface or sitting on a slope experiences a pull due to friction on the object due to the surface that opposes the object's motion. Friction is a pull that acts against motion. The following influence the effect of friction:

Texture of the surface

- *Rough surfaces* tend to create more friction.
- *Smooth surfaces* tend to create less friction.

Lubrication

- *Lubrication*, for example oil or grease, reduces the effects of friction. Without lubrication, moving parts of machines would slow down or stop very quickly.

Extended Knowledge

- Design solutions to problems related to friction that occurs between solids moving through liquids or gases.

Science and Engineering Practices

S.1B.1

Standard

2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

Conceptual Understanding

2.L.5A There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.

Performance Indicator

2.L.5A.1 Obtain and communicate information to classify animals (such as mammals, birds, amphibians, reptiles, fish, or insects) based on their physical characteristics.

Assessment Guidance

The objective of this indicator is to *obtain* and *communicate* information to classify animals based on their physical characteristics. Therefore, the primary focus of assessment should be for students to *obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations, and to communicate observations* about animals and their characteristics in order to *classify* the animals into groups according to their similarities. Students should also communicate observations and explanations using oral and written language. This could include but is not limited to students reading informational text about different

animals, making detailed, labeled drawings of the animals, and placing their drawings on a class chart in categories based on shared characteristics.

In addition to *obtaining and communicating information*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models*; and *construct devices or design solutions.*

Previous and Future Knowledge

- K.L.2A.3 Structures for walking, holding, touching, seeing, smelling, hearing, talking, and tasting
- 4.L.5A.1 Physical characteristics of plants (flowering and non-flowering) and animals (vertebrates and invertebrates)

Essential Knowledge

There are many different ways that animals can be classified. One way to classify animals is by their physical characteristics, such as their method of mobility, method of obtaining food, or their production of young. Animals can be classified into the following groups:

Insects

- Insects have antennae, three body parts, and six legs and usually have wings.
- Examples of insects are ants, butterflies, or bees.
- Spiders are not insects.

Fish

- Fish have fins, live in water, and breathe through gills.
- Some examples of fish are goldfish, guppies, or sharks.

Amphibians

- Amphibians live both on land and in water.
- Amphibians have moist skins and no scales.
- Most amphibians lay eggs in water, and the young breathe with gills before developing lungs and breathing air as adults.
- Some examples of amphibians are salamanders, frogs, or toads.

Reptiles

- Reptiles have scales or rough, dry skin
- Some examples of reptiles are snakes, lizards, and turtles.

Birds

- Birds have a bill or beak, feathers, wings, and lay eggs.
- Some examples of birds are parrots, ostriches, or penguins

Mammals

- Mammals have fur or hair, usually give birth to live young, and can nurse their young with milk.
- Some examples of mammals are humans, dogs, or cows

Extended Knowledge

Learners may be engaged in a study regarding other details about the listed animals.

Science and Engineering Practices:

S.1A.8

Standard

2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

Conceptual Understanding
2.L.5A There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.

Performance Indicator
2.L.5A.2 Construct explanations for how structures (including structures for seeing, hearing, grasping, protection, locomotion, and obtaining and using resources) of different animals help them survive.

Assessment Guidance
The objective of this indicator is to *construct explanations* for how structures of different animals help them survive. Therefore, the primary focus of assessment should be to *construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams* to explain how the structures of different animals help them survive. This could include but is not limited to students using data from student-generated investigations of animal structures, organizing their data in a table or diagram, and using their data to explain how animal structures for seeing, hearing, grasping, protection, locomotion, and obtaining and using resources aid in survival.

In addition to *constructing explanations*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; obtain, evaluate, and communicate information; develop and use models;* and *construct devices or design solutions.*

Previous & Future Knowledge
- K.L.2A.5 Basic needs of organisms (air, water, food, shelter)
- 4.L.5B.3 Adaptations of animals (methods for defense, locomotion, obtaining resources, or camouflage)

Essential Knowledge
Animals (including humans) have special body parts that they use to survive. These body parts are used for seeing, hearing, grasping objects, obtaining food and other resources, protecting themselves, and moving from place to place).
Seeing
- Animals have eyes for finding food or for seeing other animals that may attack; for example, owls and other birds of prey have exceptional eyesight for finding small rodents.

Hearing
- Animals have ears of different sizes that allow them to hear approaching danger or animals they might eat; for example, white-tailed deer have large ears to hear and run away from dangerous animals.

Grasping Objects
- Animals have structures for grasping objects, for example, chimpanzees have hands for holding food or tree branches; raccoons have hands that hold food; humans use their hands to hold objects for many purposes (eating, working, defense).

Obtain Food and Other Resources
- Animals have specialized structures used for obtaining food, for example the beaks of birds, mouths of insects, teeth, or claws. Their feeding structures are specialized to enable them to eat the food available in their environment.

Protection

- Some animals have special body parts for defense or protection from being hurt, killed, or eaten. For example, quills and claws; wings for taking flight; spraying; camouflage.

Movement

- In order for animals to find the resources they need for food, shelter, or space, they must be able to move around.

- Animals have special structures for moving depending on where they live; for example above ground (swinging, climbing and flying), on the ground (crawling, walking, hopping), or in the water (floating, swimming and diving).

- The movement of animals over the same route in the same season each year is called migration. This behavior allows animals to take advantage of resources (like food and water) in one location when they run low in another location.

Extended Knowledge

- Track Monarch butterflies or Humpback whales on their migratory routes.

Science and Engineering Practices:
S.1A.6

Standard
2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

Conceptual Understanding
2.L.5A There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.

Performance Indicator
2.L.5A.3 Construct explanations using observations and measurements of an animal as it grows and changes to describe the stages of development of the animal.

Assessment Guidance
The objective of this indicator is to *construct explanations* using observations and measurements of an animal as it grows and changes to describe the stages of development of the animal. Therefore the primary focus of assessment should be to *construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams. These explanations should* describe the different stages of development of an animal using data collected from observing and measuring (as applicable) the animal throughout its lifecycle. This could include but is not limited to students using data collected from observing (and measuring) animals during student-generated investigations and identifying different animals' stages of development based on the data collected.

In addition to *constructing explanations,* students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; obtain, evaluate, and communicate information; develop and use models;* and *construct devices or design solutions.*

Previous and Future Knowledge

- K.L.2A.5 Basic needs of animals
- 4.L.5B.3 Adaptations of animals (methods for defense, locomotion, obtaining resources, or camouflage)

Essential Knowledge

All animals go through a life cycle.

Life Cycle:

- The birth and stages of development organisms go through during their lifespan and ends with the organism dying.

There are two ways that animals are born: live from the mother or hatched from eggs.

- Some examples of animals that give live birth are humans, dogs, whales, or deer (nearly all mammals).
- Some examples of animals that hatch from eggs are birds, fish, turtles, alligators, or insects.

Once the animals are born, their stages of development can be different.

- Some animals, for example chickens, are born looking like their parents, and continue to grow into adult chickens.
- Other animals, for example frogs and moths, are born looking different from their parents and go through different stages and change considerably at each stage.

NOTE: Some animal species within a group may hatch from eggs or give live birth that is different from most of the species. For example, some types of rattlesnakes, guppies, and sharks appear to give live birth, while the duckbill platypus, a mammal, lays eggs.

Extended Knowledge

Study different animals throughout their life cycle

Science and Engineering Practices

S.1A.6

Standard

2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

Conceptual Understanding

2.L.5B Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways.

Performance Indicator

2.L.5B.1 Obtain and communicate information to describe and compare how animals interact with other animals and plants in the environment.

Assessment Guidance

The objective of this indicator is to *obtain and communicate information* to describe and compare how animals interact with other animals and plants in the environment. Therefore the primary focus of assessment should be to *obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations,* about how animals interact with each other and plants in their environment. Students should *communicate observations and explanations using oral and written language* This could include but is not

limited to students collecting data and information about the plants and animals in a specific environment and using that information to create a class chart which shows survival relationships between plants and animals in that environment.

In addition to *obtaining and communicating information*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models*; and *construct devices or design solutions.*

Previous and Future Knowledge

- K.L.2A.1 Organisms - plants, animals, fungi - food, water, air, shelter, space
- K.L.2A.5 Basic needs of organisms (air, water, food, shelter)
- K.L.2A.6 Basic habitat needs
- 3.L.5B.2 Food chain, consumers (herbivores, carnivores, omnivores)
- 4.L.5B.1 Sensory organs, senses

Essential Knowledge

- Animals cannot survive without plants, and many plants depend on animals.
- Plants produce oxygen that animals need for breathing. Plants are sources of food for many animals and can provide shelter for other animals. For example, cows eat grass for food and some insects eat leaves; or for shelter, some trees serve as homes for small animals, such as squirrels, birds, or insects.
- Animals produce carbon dioxide, which plants need in order to make food. Some animals can be a source of nutrients for plants. For example, animal waste (such as manure from cows and chickens, or guano from bats) can become fertilizer for plants.

Extended Knowledge

- Study how manure is turned into fertilizer.
- Research plant species that attract specific animal species and design a garden; for example, butterflies or hummingbirds.

Science and Engineering Practices:
S.1A.8

Standard
2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

Conceptual Understanding
2.L.5B Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways.

Performance Indicator
2.L.5B.2 Develop and use models to exemplify characteristics of animals that help them survive in distinct environments (such as salt and freshwater, deserts, forests, wetlands, or polar lands).

Assessment Guidance
The objective of this indicator is to *develop and use models* to exemplify characteristics of animals that help them survive in distinct environments (such as salt and freshwater, deserts, forests, wetlands, or polar lands). Therefore the primary focus of assessment should be to *develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others* about the characteristics of animals that help them survive in specific environments. This could include but is not limited to students developing models from scientific evidence that represent different environments such as salt and freshwater, deserts, forests, wetlands, or polar lands and include the animal characteristics that help them survive in those specific environments.

In addition to *developing and using models*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; obtain, evaluate, and communicate information*; and *construct devices or design solutions.*

Previous and Future Knowledge
- K.L.2A.5 Basic needs of organisms (air, water, food, shelter)
- 1.L.5B.2 Characteristics of Plants, Environments (deserts, forests, grasslands)
- 3.L.5A.1 Physical factors (light, temperature, water, soil, and space for shelter and reproduction) of environments (salt water, fresh water, deserts, grasslands, forests, rainforests, polar regions)
- 4.L.5B.3 Adaptations of animals (methods for defense, locomotion, obtaining resources, or camouflage)

Essential Knowledge
Animals require air, water, food, and shelter and can only survive in environments where these needs can be met. There are distinct environments in the world (for example, salt and freshwater, deserts, forests, wetlands, or polar lands) that support the life of different types of animals. Animals have characteristics that help them survive in these distinct environments.

Saltwater
- Ocean water can be very cold; therefore marine mammals like whales have a thick layer of blubber (fat) to keep them warm.
- A shark has fins and a streamlined body to help it move quickly through the water, gills for getting oxygen out of the water, and very sharp teeth for eating other marine animals.
- At the deepest levels of the ocean, it can be very dark, so those organisms have adapted to survive without the need for light.

Freshwater
- Rivers and lakes are freshwater habitats that are home to trees and plants along the edges and many fish, insects, turtles, and birds.

Deserts
- Animals that live in the desert have structures that help them cope with a shortage of water, extreme changes in temperature, and a shortage of food.
- Many desert animals get water directly from the food they eat, so they don't have to search for water.
- Many desert animals have structures for digging burrows in the sand, where they stay during the hot daytime, for example, lizards.

Forests
- Forests have many plants and trees in them. Many animals that live in the forest eat the plants for their food.
- American forests have distinct seasons, with cold winters where there is limited food available and hot summers during which there may be drought. Many forest animals have adapted to this by hibernating

through the winter. The American black bear hibernates through the winter until spring brings new growth to the plants.
- The animals use the forest trees for shelter. Squirrels and owls live in forest trees.
- Many animals use camouflage to blend in with their environment. Fawns, which are baby white-tailed deer, are brown with spots, which helps them blend into the forest.

Wetlands
- Wetlands are lands that have very shallow water or wet soil most of the time. Swamps and marshes are wetlands.
- The American Beaver has a wide, flat tail and webbed feet for swimming. Its coat is waterproof. It can close its nose and ears so water doesn't come in while it is swimming underwater.
- Some insects, like pond skaters, have specialized paddle-like legs that allow them to move across the top of the water.

Polar Lands
- Polar lands have very cold temperatures, deep snow and long, dark winters.
- Polar bears grow a thick coat of fur to keep warm in the cold, deep snow.

Penguins have wings that work like fins since they spend most of their time in the water hunting for food.

Extended Knowledge
Learn about each environment and the animals that live there in greater detail.

Science and Engineering Practices:
S.1A.2

Standard
2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

Conceptual Understanding
2.L.5B Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways.

Performance Indicator
2.L.5B.3 Analyze and interpret data from observations to describe how animals respond to changes in their environment (such as changes in food availability, water, or air).

Assessment Guidance
The objective of this indicator is to *analyze and interpret data* from observations to describe how animals respond to changes in their environment (such as changes in food availability, water, or air). Therefore the primary focus of assessment should be to *analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings to describe* how animals respond to changes in their environment in different ways. This could include but is not limited to students gathering, recording, and using data as evidence to identify changes that occur in an environment, such as changes in food availability, water, or air that cause an animal to migrate.

In addition to *analyzing and interpreting data,* students should *ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations;*

develop and use models; obtain, evaluate, and communicate information; and *construct devices or design solutions.*

Previous and Future Knowledge

- 1.L.5B.3 Plant responses (turning leaves toward the sun, leaves changing colors, leaves wilting, trees shedding leaves)
- 3.L.5B.2 Food chain, consumers (herbivores, carnivores, omnivores)
- 4.L.5B.2 Structural adaptations of plants (roots, stems, leaves, flowers, fruit, seeds)
- 4.L.5B.3 Adaptations of animals (methods for defense, locomotion, obtaining resources, or camouflage)

Essential Knowledge

Animals respond to changes in their environment in different ways. The number of animals in an environment will increase or decrease depending on the availability of food and other resources. Insects produce large numbers of offspring because many of their offspring become food for other animals. The temperature, amount of rainfall, and the vegetation in an environment can affect how an animal reacts to its environment. Animals may hibernate or migrate to other areas when the temperature becomes too cold and food becomes scarce. For example, bears, whales, or migratory birds.

NOTE TO TEACHER: This may be an opportunity for students to collect, organize, and represent data with up to four categories using picture graphs and bar graphs with a single-unit scale.

Extended Knowledge

Students conduct investigations or develop models to learn about the effects of competition for resources or space.

Science and Engineering Practices

S.1A.4

Standard

2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

Conceptual Understanding

2.L.5B Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways.

Performance Indicator

2.L.5B.4 Construct scientific arguments to explain how animals can change their environments (such as the shape of the land or the flow of water).

Assessment Guidance

The objective of this indicator is to *construct scientific arguments* to explain how animals can change their environments (such as the shape of the land or the flow of water). Therefore the primary focus of assessment should be to *construct scientific arguments to support claims or explanations using evidence from observations or data collected to explain* how the way animals change the shape of the land or flow of water can be harmful or helpful. This could include but is not limited to students using scientific texts and observations as evidence to

make claims as to whether it is helpful or harmful to the land and water flow when beavers construct dams. The students then analyze and evaluate the claims of other students based on scientific evidence.

In addition to *constructing scientific arguments from evidence*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; construct explanations; obtain, evaluate, and communicate information; develop and use models;* and *construct devices or design solutions.*

Previous and Future Knowledge

- This is the first time that students have been introduced to the idea that animals can change their environments.
- 5.L.4B.4 Balance of nature, limiting factor

Essential Understanding

It is essential for students to know that animals (including humans) can change the environment in which they live. They might change the shape of the land or the flow of water. Some of these changes are harmful to the organism or other organisms, while other changes are helpful to the organism or other organisms.

Humans change environments in ways that can be either harmful or helpful for themselves and other organisms. Some examples of human behaviors that change environments may be:

- cutting down trees to use the logs for building homes or businesses, but replacing the cut trees by planting new trees.
- building a dam on a river that backs up the water to create a lake for recreational use
- Using chemicals to control insects or weeds.

Other animals also impact the environments. Some of these changes can be harmful and some can be helpful. Some examples of how other animals can change the environment may be:

- Herd animals (cattle) might overgraze land leading to erosion, but they can also fertilize the fields on which they graze and new plants can grow.

Beavers build dams which block or change the flow of water, which can create pond environments for new plants and animals can survive, but can also cause flooding of homes.

Extended Knowledge

- Ways in which land and/or water may be conserved or restored after a harmful change to an environment by an animal

Science and Engineering Practices

S.1A.7